

2.0 Project Alternatives

The complexity of this project with respect to the project purpose and need, and the strong emphasis on cumulative impact analysis, necessitated a multi-tiered approach to formulate study alternatives. Two study alternatives were formulated to meet the regulatory mandate of the USACE, pursuant to its authority under Section 10 of the Rivers and Harbors Act of 1899 and Section 404 of the CWA. Such alternatives are considered to be “primary” alternatives that are being considered by the USACE as the lead Federal agency responsible for compliance under NEPA. In contrast, “secondary” actions are those considered by other parties (public or private) that are formulated to address the past, present or reasonably foreseeable future actions that respond to the local need for flood control, future economic growth and land use development, and future roadway improvements. Secondary actions are presented and described in this section and are in conjunction with the primary alternatives assessed in the Environmental Consequences (Section 4.0) of this document.

2.1 Primary Alternatives – Regulatory Alternatives of the Lead Agency

2.1.1 Alternative 1 – No Action (Maintain Existing Permitting Program)

This alternative consists of the No Action alternative under which permitting will be considered within the constraints of the existing USACE Regulatory Program. For this alternative, issuance of nationwide and individual permits will be consistent with current USACE policies and procedures as set forth in 33 CFR Parts 320-331.

The USACE has the responsibility to administer a permit program to regulate structures in navigable waters and the placement of dredged and fill material into waters and wetlands of the United States. Authority is given to the USACE under Section 10 of the Rivers and Harbors Act of 1899 and Section 404 under the CWA of 1977. Currently permit applications are processed on a case-by-case basis and are evaluated individually. As permit applications are received, each application is logged in and assigned to the appropriate USACE geographic project manager. In the case of proposed projects within the Howard Bend floodplain, permit applications go to the Missouri Team and are assigned to the project manager working south of the Missouri River. Such applications are queued in with all the other applications south of the Missouri River and evaluated in order, unless otherwise directed by USACE management. The USACE will review the project, determine if a permit is necessary, and determine the type of permit that can be used for the proposed action.

Projects having minor impacts to waters of the United States can be permitted by using existing nationwide permits. Projects qualifying for an existing nationwide permit, by meeting certain thresholds, must request authorization and verification from the USACE. Nationwide permit authorization can be issued in 30 to 60 days from receipt of the application. By comparison, activities that do not qualify for permitting under the nationwide program require that applicants follow the individual permit process. Application review requires the issuance of a public notice and a public interest review. The individual permit process is very time intensive and on average, will take 3 to 6 months.

Under the No Action alternative, the USACE will continue to operate the regulatory program using its normal procedure and will evaluate each permit application in the Howard Bend

floodplain on a case-by-case basis. Typical characteristics of the current regulatory program are presented in Table 2-1.

Table 2-1. Characteristics of Primary Alternatives

Primary Alternative	Public Interest Review	Evaluation Time (Days)	Capacity for Comprehensive Planning	Capacity for Consideration of Cumulative Impacts	Potential for Fragmented Mitigation	Management Responsibility for Mitigation Site
Case-By-Case Permitting						
Nationwide Permit	NO*	30-60	LOW	LOW	HIGH	LOW
Individual Permit	YES	90-180	LOW	LOW	HIGH	MEDIUM
Special Areas Management Plan (see Section 2.1.2)						
SAMP	YES*	30-60	HIGH	HIGH	LOW	HIGH

* The Public Interest Review is already complete in the development of the General Permit.

Under case-by-case permit evaluation, impacts will be examined individually for a given project apart from any long range aquatic protection plan and development plan. Each applicant has the right to submit permit applications independently, and there is no control as to when applications are submitted to the USACE. Consequently, the USACE assumes that the applicant has land ownership and can build the project and therefore, begins each evaluation in the order in which the applications are received. This process has, in some areas, resulted in a fragmentation of the wetland resource and incremental loss of wetland acreage and functional value. Small isolated tracts of mitigated wetlands are often created with no central management responsibility to establish and monitor the success of the mitigation. Mitigation is also often not timely, being constructed subsequent to wetland and stream impacts, and has often times been ineffective. Cumulative impacts are very difficult to assess for individual projects. Under this alternative, the City of Maryland Heights would also lack any control or approval authority for impacts to wetlands and waters of the United States within the Howard Bend study area.

2.1.2 Alternative 2 – Special Area Management Plan

Alternative 2 consists of the issuance of permits in accordance with the requirements and procedures of a Special Area Management Plan (SAMP). The intent of the SAMP will be to control and manage wetland and surface water resources in the Howard Bend floodplain and provide for a more cohesive approach to the conversion of waters of the United States, as well as the mitigation of unavoidable adverse impacts. Permitting of projects potentially impacting these resources shall be covered under the provisions of a General Permit and in a manner consistent with the SAMP.

The 1980 Amendments to the Coastal Zone Management Act define the SAMP process as

“A comprehensive plan to provide for natural resource protection and reasonable coastal-dependent economic growth containing a detailed and comprehensive statement of policies, standards and criteria to guide public and private uses of lands and waters; and mechanisms for timely implementation in specific geographic areas within the coastal zone.”

This process of collaborative interagency planning within a geographic area of special sensitivity is just as applicable in non-coastal areas. The USACE has developed a Regulatory Guidance Letter (RGL) 86-10 with a time extension in RGL 92-03 to address SAMPs. The USACE guidance indicates that a SAMP designed to reduce the incremental loss of wetland acreage and functional value will reduce the creation of small unconsolidated mitigation areas, and reduce inconsistent ownership and management of mitigation lands associated with case-by-case project review. The SAMP will also allow developers to plan with predictability and assure regulatory and conservation agencies and other interested parties that individual and cumulative environmental impacts will be analyzed in the context of the ecosystem needs. An ideal SAMP should also conclude in an end product that facilitates an abbreviated permit processing procedure that identifies restrictions for undesirable activities in the SAMP area.

The St. Louis District is the lead agency responsible for the Howard Bend floodplain SAMP development. Under this alternative, the intent is to establish an area-wide plan to minimize individual and cumulative impacts of future projects in the Creve Coeur and Fee Fee creeks watersheds located within the Missouri River floodplain known as the Howard Bend Bottoms. The goals are to provide natural resource protection, provide a practical and predictable process for development, and promote consolidated regional land use and environmental planning. The SAMP will reflect the City of Maryland Heights' goals of quality land use planning that incorporates environmental resources planning with flood protection and open space; stormwater management; traffic planning; sewer and water infrastructure planning; and parks, recreation and tourism planning. Similarly, the SAMP will also reflect the goals and objectives of the City of Chesterfield (as per their Comprehensive Plan) and St. Louis County Parks Department (CCLMP Master Plan).

SAMP Plan Features

- **Land Use Plan** – The SAMP shall incorporate the Future Land Use Plan recently adopted by the City of Maryland Heights. Rather than make parcel-specific land use recommendations, the Plan identifies a range of potential land uses allowable in each of five districts (see Section 2.2.5). The Future Land Use Plan also identifies developmental restrictions (zoning codes, development regulation, and building codes) to ensure quality, compatible relationships to other development, adequacy of public facilities, and environmental protection.
- **Wetland Protection and Preservation** – The SAMP alternative identifies lands that are to be provided an additional level of protection or restricted from development. The protected areas include lands located riverside of the 500-year levee, wetlands and creeks within the Creve Coeur Lake complex, and wetlands within the Little Creve Coeur Lake area (Figure 2-1). Wetlands within these areas may be limited from any future development and shall be subject to any pre-existing requirements for monitoring and maintenance (e.g., MoDOT mitigation lands). For wetlands outside of these areas, that cannot be avoided by development, the applicant will be required to mitigate by purchasing credits at one or more mitigation sites or mitigation banks. All unavoidable impacts to wetlands shall be subject to mitigation.
- **Wetland Mitigation** – For those wetlands that are not protected and are subject to potential impact, the SAMP will establish mitigation formulas based upon the functional assessment of the impacted wetlands or waters of the United States and the potential for mitigation at the mitigation sites or banks. On December 24, 2002, the USACE and USEPA published Mitigation RGL-02-02. This RGL is intended to improve the success of compensatory

mitigation and meet the nation's goal of "No Net Loss" with regards to wetlands. The new RGL clarifies the USACE position on a number of points including the following:

- increased use of functional assessment tools,
- improved performance standards, and
- a stronger emphasis on monitoring of wetland mitigation.

The new RGL encourages a watershed-based approach to aquatic resource protection, and fits in well with the SAMP proposal. The USACE has traditionally used "acres" as the standard measure for determining impacts and required mitigation for wetlands and other aquatic resources, primarily because useful functional assessment methods were not available. The USACE will now actively increase their reliance on functional assessment methods. USACE districts will determine, on a case-by-case basis, whether to use a functional assessment or acreage surrogates for determining mitigation and for describing authorized impacts. Districts will use the same approach to determine losses (debits) and gains (credits) in terms of amounts, types, and location(s) for describing both impacts and compensatory mitigation.

The St. Louis District will develop a functional assessment method for mitigation planning for the SAMP study area. The objective will be to provide, at a minimum, one-to-one functional replacement (i.e., no net loss of functions). Focusing on the replacement of functions provided by a wetland, rather than only calculation of acreage impacted or restored, in most cases will provide a more accurate and effective way to achieve the environmental performance objectives of the "No Net Loss" policy. In some cases, replacing the functions performed by one wetland can be achieved by another, smaller wetland; in other cases, a larger replacement wetland may be needed to replace the functions of the wetland impacted by development. Consequently, on an acreage basis, the ratio should be greater than one-to-one where the impacted functions are demonstrably high and the replacement wetlands are predicted to have a lower function. Conversely, the ratio may be less than one-to-one where the functions associated with the area being impacted are demonstrably low and the replacement wetlands provide higher function. However, in the absence of more definitive information on the functions of a specific wetland site, a minimum one-to-one acreage replacement may be used as a reasonable surrogate for no net loss of functions. These ratios can be higher based upon the wetland being impacted. Specific amounts and types of required mitigation will be identified, and rationale provided for acreage replacement and the factors considered when the required mitigation differs from the one-to-one acreage surrogate. If an acreage surrogate is used, the following minimum wetland mitigation ratios have been established within the St. Louis District:

<u>Wetland Type</u>	<u>Replacement Ratio</u>
Farmed Wetland	1:1
Emergent Wetland	1.5:1
Scrub shrub Wetland	1.5:1
Forested Wetland	1.5:1
Open Water	1:1

The SAMP will establish one or more mitigation sites or banks in accordance with RGL 02-2, other regulations or guidance, and the Federal Guidance for the Establishment, Use and Operation of Mitigation Banks (Federal Register, November 28, 1995). Compensatory mitigation for impacts will be required to occur at one of these pre-approved sites within the study area. The SAMP will identify a public or private entity who will administer the mitigation site or bank. Each mitigation site or bank will have a mitigation plan or banking prospectus to create a banking instrument as required in the Federal Guidance and will be created on

non-jurisdictional wetland sites, on hydric soils and supported by sufficient wetland hydrology. The SAMP will establish all appropriate specifications and requirements for mitigation site or bank construction, operation (i.e., debiting and crediting), management, and maintenance. It is anticipated that the mitigation sites or banks will be designed to establish a site having a mosaic of open water, emergent, scrub shrub, and forested community types to provide maximum wetland function and value. Acceptable trees include river birch, pin oak, white oak, swamp white oak, green ash, pecan, red oak, hackberry, and hawthorn. Within the Howard Bend floodplain, possible mitigation sites or bank locations are within the lower Creve Coeur Creek flank levee system, the north portion of Little Creve Coeur Lake, HBLD borrow area along Water Works Road, and HBLD borrow area riverside of the main stem levee. The potential service area for the mitigation sites or banks is the entire Creve Coeur Creek and Fee Fee Creek upland and floodplain watersheds in St. Louis and St. Charles counties that are adjacent to the Missouri River in the floodplain landscape. The mitigation sites or banks will be protected by a deed restriction, covenant of restriction, or conservation easement to allow uses and protect them in perpetuity.

- **Tree Replacement** – Tree mitigation will be provided for in accordance with the City of Maryland Heights' Landscaping Design Regulations (City of Maryland Heights, 2002). Tree preservation and replacement shall be in accordance with the provisions of Section 25-19.5 of Ordinance 2002-2120. Trees considered under this policy are those that exceed 6 inches caliper. Accordingly, tree replacement shall be on the basis of caliper (two for one, and one for one) depending on the location and size of the tree impacted. Trees shall be planted in accordance with an approved planting plan. Replacement species shall be native trees found in the region.
- **Cultural Resources Protection** – Cultural resource protection under the SAMP shall be in accordance with the provisions of Section 106 of the National Historic Preservation Act and Appendix C of the USACE Regulatory Program (33 CFR Part 325) to protect cultural resources. Recorded sites known to be eligible for listing on the National Register of Historic Places (NRHP) include both historic archaeological sites and architectural sites (see Section 3.2). Any Federally funded project or non-Federally funded project requiring the issuance of a Federal permit must comply with the provisions of Section 106 and shall entail a review of recorded information and a Phase I pedestrian survey of the potentially affected property. Potential impacts to any known or newly discovered NRHP-eligible sites shall be in accordance with the requirements of the State Historic Preservation Office of the Missouri Department of Natural Resources (MDNR) and the Advisory Council of Historic Places (ACHP).
- **Sensitive Species** – A sensitive species review shall be performed to identify any threatened and endangered species and critical habitat in the proposed study area. Coordination will include U.S. Fish and Wildlife Service (USFWS) and Missouri Department of Conservation (MDC) records and file review and will result in appropriate avoidance and mitigative measures should a listed species be found to utilize the site.
- **Vegetated Buffers** – Vegetative buffers are recognized as providing valuable function in terms of both water quality enhancement and wildlife habitat. In order to provide for these functions within the area covered by the SAMP, natural habitats or grass planted buffer strips shall be established according to the guidance in Table 2-2.

Table 2-2. SAMP Buffer Recommendations

Element	Buffer Requirement	Additional Controls
Underseepage Berm	Buildings – 50-foot setback Ditches – 100-foot setback	Grass buffer
SAMP Wetlands	100 feet	No mowing, buffer to consist of native plant species.
Mitigation Areas	100 feet	No mowing, buffer to consist of native plant species.
Golf Courses	50 feet	Grass buffer
Agricultural Field	50 feet	Grass buffer
Streams/Lakes	50 feet	No mowing, buffer to consist of native plant species.

- **Water Quality Protection** – Erosion control methods will be implemented during construction and permanent stabilization measures to minimize erosion, detain excess stormwater runoff, and prevent offsite sedimentation. Construction should be timed or phased to minimize exposed grading work. Protection measures can include fabric, stone, temporary or final seeding, straw bales or perimeter silt fences. All conditions of the MDNR water quality certification (included in the General Permit) must be met to ensure that the project has no adverse affects on water quality.

Permit Process – General Permit

The USACE will seek to develop a General Permit through the public interest review process by obtaining input from the resource agencies and all concerned groups and individuals. The General Permit will attempt to identify (through the SAMP, and avoidance and minimization) the wetlands or other aquatic resources that can be impacted and mitigated on a watershed basis within the SAMP study area. The General Permit will be signed by the USACE' District Engineer and will remain in effect for a period of 5 years and encompass the SAMP jurisdictional area. Upon expiration, the permit may be extended for another 5 years or if warranted, modified through a new public interest review. The General Permit will be coordinated with MDNR and incorporate any water quality certification for the proposed activities.

The USACE will issue the General Permit as part of the SAMP along with the City (Maryland Heights or Chesterfield) zoning/construction permits. Each development zoning/construction permit would be issued by the City on a project-by-project basis after a public notice announcement and a public interest review, and in accordance with the General Permit and SAMP.

Specific requirements of each permit application under the SAMP and zoning/construction permit shall be formulated in detail during the permit development process but are expected to include the following:

- Detailed site plan (showing site development, plan views, and cross sections);
- Wetland delineation map;
- Tabulation of acreage and type of wetlands impacted;
- Tree inventory and replacement plan;
- Stormwater management and interior drainage plan (construction plan approved by MDNR and MSD);
- FEMA floodplain compliance;
- Onsite cultural survey or letter from the State Historic Preservation Officer (SHPO) clearing the site;

- Onsite threatened and endangered species survey;
- Demonstration of compliance with buffer requirements;
- Water quality protection plan (erosion control plan);
- Infrastructure connections;
- Traffic analysis; and
- Statement of compliance with other local, state and Federal regulations.

The permit application review process will be performed by the USACE and the Cities of Maryland Heights or Chesterfield (as appropriate) and will include the following steps:

1. Complete Section 404 permit application sent to the USACE to determine if the proposed project fits the General Permit or would need to be evaluated under a special individual permit review.
2. Complete application sent to the appropriate City Planner, who would then review the completed application and recommend approval or denial to Planning Commission.
3. Department of Community Development issues a 30-day public notice to solicit comments regarding the proposed project.
4. After public hearing and the evaluation of comments, City Planning Commission makes final decision on zoning/construction development permit consistent with the General Permit and SAMP.

The SAMP permit instrument is a USACE Regional General Permit (RGP) that will be administered by the USACE with input and approval of zoning/construction permits issued by the City of Maryland Heights and/or the City of Chesterfield. The RGP permit will include any 401 water quality certification from MDNR. The permit package will authorize a construction period of 5 years and allow a permit extension not-to-exceed 5 years. The permit is transferable with property title transfer.

Upon project implementation, the developer will provide the USACE and the appropriate City as-builts drawings and monitoring reports (as necessary). These data shall be in a format that can be incorporated in the USACE and City of Maryland Heights' Geographical Information System (GIS). In the event of the denial of a given permit application, the developer has the right to appeal. A joint review by the USACE, City, and MDNR will be conducted.

2.2 Cumulative Impact Analysis (Secondary Actions)

In accordance with 40 CFR 1508.7, the assessment of potential secondary and cumulative impacts shall consider all appropriate "past, present, and reasonably foreseeable future actions" that may impact the environmental resources within the Howard Bend floodplain. With respect to reasonably foreseeable future actions, those considered are limited to projects that have been identified for the study area and those that have demonstrated some level of commitment by the project proponent (e.g., approved plan, commitments to mitigative measures, financial commitments to the project, expenditure of effort for preliminary designs, etc.). This assessment is provided in detail in Section 4.0 of this document. Past, present, and reasonably foreseeable future actions that will be considered in the assessment of cumulative impacts within the Howard Bend study area are summarized in Table 2-3. Past and present actions are illustrated in Figures 2-2 and 2-3.

Table 2-3. Summary of Past, Present, and Reasonably Foreseeable Future Actions Included in the Cumulative Impact Analysis

Timeframe	Description of Action
Past	<ul style="list-style-type: none"> <input type="checkbox"/> Page Avenue Extension <input type="checkbox"/> Expansion of Creve Coeur Airport <input type="checkbox"/> Riverport Development <input type="checkbox"/> Harrah's Casino Complex <input type="checkbox"/> Sportport <input type="checkbox"/> Expansion of Missouri American Water Company Plant <input type="checkbox"/> Expansion of the MSD Plant
Present	<ul style="list-style-type: none"> <input type="checkbox"/> Howard Bend 500+3 Levee (construction stage) <input type="checkbox"/> MHE Extension to River Valley Drive (construction stage) <input type="checkbox"/> Expansion of functional capacity of Page Interchange with MHE to accommodate four through lane capacity (construction stage)
Reasonably Foreseeable Future	<ul style="list-style-type: none"> <input type="checkbox"/> Howard Bend flank levee system for Creve Coeur, Fee Fee and Louiselle creeks <input type="checkbox"/> MHE Extension south to Olive Boulevard <input type="checkbox"/> Baxter Road Extension (Chesterfield Valley Spur) Connection <input type="checkbox"/> Hog Hollow Road Relocation <input type="checkbox"/> MSD Plant expansion <input type="checkbox"/> Build Out of City of Maryland Heights Draft Land Use Plan <input type="checkbox"/> Terra Vista Estates <input type="checkbox"/> Mill Ridge Villas <input type="checkbox"/> Dredging of Creve Coeur Lake

Alternatives have previously been considered and evaluated [either pursuant to NEPA, or Section 404(b)(1) of the CWA, or both] for each of the past and present actions. One exception, however, is that of the on-going improvements to the Howard Bend Levee. This action, being undertaken by the HBLD is being privately funded and will not require the issuance of a Federal permit (and is therefore, not subject to Federal control). In spite of this, the design of the improvements to the levee to provide for 500-year (+3 feet) protection has considered a number of alternatives. Features of the primary levee include the following:

1. Throughout much of its length, the primary levee has been designed and constructed on the identical alignment of the existing levee system. The existing levee system provided variable degrees of flood protection, estimated to range from a 20- to 40-year recurrence interval.
2. In two separate areas, for a total distance of 13,100 lineal feet the design and subsequent construction of the levee resulted in the relocation of the existing levee out of the existing floodway. As a result, the entire levee is now outside the FEMA floodway.
3. For the entire length of the project, the construction of the primary levee has effectively avoided impacts to waters of the United States.

During the design process, the HBLD initially believed that a 100-year levee design would be adequate. However, after the 1993 flood, the HBLD determined that developers in the St. Louis real estate market were demanding greater level of flood protection. Consequently, it became clear that the desire to attract high quality development necessitated a superior (500-year) level of flood protection and that a 100-year level of protection would inhibit development and compromise the quality of development that would be attracted.

Since the decision to build was not subject to permit, the HBLD felt that the 500-year levee was very much worth the additional investment in flood protection in terms of flood security and cost/benefit ratio.

Several actions are considered in conjunction with the cumulative impact analysis that are within the “reasonably foreseeable” future timeframe. Each of these actions and their associated reasonable alternatives are described below.

2.2.1 Interior Flood Control and Drainage System

At present, the interior stormwater drainage and conveyance system within the Howard Bend floodplain consists of a series of channelized streams and minor man-made ditches. Within the area protected by the 500-year HBLD Levee, these features consist of Creve Coeur Creek, Fee Fee Creek, and Louiselle Creek.

Stormwater runoff from the intensely developed upland watersheds of each of these creeks is conveyed to the floodplain and ultimately to the Missouri River. Low levees (i.e., “flank levees”) that were constructed in the 1940s and 1950s along these creeks provide overbank flood protection from an approximate 10- to 20-year storm event. However, larger storm events (i.e., 50- to 100-year recurrence interval) often result in extensive flooding of low-lying lands within the floodplain. In fact, in response to some high intensity storm events, runoff patterns can be quite unusual. Indeed, under such conditions runoff from the steeper Fee Fee Creek watershed reaches the confluence of Creve Coeur and Fee Fee creeks and flows upstream into lower Creve Coeur Creek and subsequently, into Creve Coeur Lake.

Primary areas that provide detention and storage of stormwater include Creve Coeur Lake, the Creve Coeur Lake sedimentation basin, depressional areas such as Little Creve Coeur Lake, and to a lesser extent, a variety of smaller, predominantly man-made ponds and basins. Creve Coeur Lake provides about 7.8 feet of temporary storage (2,340 acre-feet) above normal pool before park beaches, boat ramps, trails, and Marine Avenue are impacted.

Potential future improvements in interior drainage and flood control are being considered by the HBLD as part of its long-term planning process. These improvements (considered to be Phase III of HBLD’s overall flood protection and stormwater control program) are intended to provide a centralized conveyance and detention system within the study area that will diminish interior flooding problems and support future development. Several alternatives are analyzed in this EIS to facilitate the cumulative impact analysis of this reasonably foreseeable future action:

1. No flank levee improvement (No Action);
2. Alternative A – Gated Discharge to Missouri River; and
3. Alternative B – Gated Discharge at Creve Coeur Creek/Fee Fee Creek Junction.

Characteristics of each of these alternatives are presented in Table 2-4 and are described in the following sections.

	Existing Conditions	Plan A – Gated	Plan B – Open
Acreage within HBLD	6,470	6,470	6,470
Lands Dedicated to Flood Protection (acres)	530	640	570
Lands Subject to Flooding (acres)	2,370	1,810 – 1,900	1,830 – 1,920
Developable Property (acres)	1,030	590 – 650	660 – 730
Volume of Earth Cut (cubic yards)	0	1,744,370	418,000
Volume of Earth Filled (cubic yards)	0	156,510	159,230
Underseepage Berm (acres)	230	230	310
Estimated Cost	--	\$25.9 M	\$25.1 M

Source: Horner & Shifrin, 2003.

2.2.1.1 No Flank Levee Improvement

Improvements to the flank levee systems along Fee Fee and Creve Coeur creeks are a central feature of any effort to provide additional interior drainage and flood protection within the northern portion of the Howard Bend floodplain. Under this alternative, no such improvements would be made. The Howard Bend 500-year levee will provide protection from Missouri River flooding, but under flood conditions, the gated outlet structure of Creve Coeur Creek at the river will be closed, thereby retaining interior water for a longer duration.

Ponding will also continue to occur in the floodplain adjacent to the creeks, and under the conditions resulting from a 100-year storm, as much as 2,400 acres would remain flooded. Sources of this flood water would come from upland runoff and subsequent overbank flooding of the creeks, coupled with poor interior drainage. Additionally, in response to high-intensity rainfall events, stormwater carried by Fee Fee Creek would continue to back up into Creve Coeur Lake.

2.2.1.2 Flank Levee Alternative A – Gated Discharge at Missouri River

This alternative is characterized by improvements to the flank levees along Creve Coeur, Fee Fee and Louiselle creeks to provide 100-year interior flood protection with a gated outlet to the Missouri River. Primary elements of the improvements would include constructing flank levees along Creve Coeur and Fee Fee creeks to provide 100-year protection and to accommodate the required interior flood storage (Figure 2-4). Cross-sections of the flank levee systems would vary from 250 feet wide to 750 feet wide (outside to outside toe). Additional system features include increasing the capacity of the gated outlet structure and providing a pump station at the Missouri River to pump out interior water at times when the Missouri River is at flood stage and the gate structure is closed. Interior ponding areas outside the flank levee would be necessary to store local runoff until pumping could effectively remove it from the system. Depending upon stormwater conditions, it is estimated that the pumping capacity at this location would need to be up to 600 cubic feet per second (cfs). A variety of options for localized stormwater control and management will be implemented as a secondary drainage system in conjunction with specific site planning and land use development. A number of these options are identified in Section 2.2.1.4. The 100-year flank levees along Creve Coeur and Fee Fee creeks and the drainage channel would reduce the 100-year floodplain of these creeks and allow more areas to be developed.

Many final design details of the flank levee system have not yet been developed. However, according to discussions with the HBLD, the interior of the flank levee system will be constructed by excavation of areas adjacent to the existing creeks as is illustrated in Figure 2-4. Setback distances from the creek will vary, allowing for some preservation of the riparian corridor. Additionally, the existing channel would remain largely intact and would convey normal creek flow. Under Alternative A (gated discharge at the Missouri River), much of the lands within the flank levee system would be maintained in a condition that allows for attenuated conveyance of stormwater. However, because this flank levee alternative is primarily designed to accommodate flood storage (lower Creve Coeur Creek, Fee Fee Creek), some limited areas may also be allowed to redevelop wooded plant communities (e.g., scrub shrub and forested wetlands) in the areas between the levees with the understanding that the area cannot be allowed to accumulate silt resulting in significant displacement of stormwater storage.

2.2.1.3 Flank Levee Alternative B – Gated Discharge at Creve Coeur Creek/Fee Fee Creek Junction

This alternative is characterized by the development of a flank levee system that provides 500-year flood protection with a permanently open discharge connection between the Missouri River and Creve Coeur Creek. The existing closure structure would be removed from the levee along the Missouri River, allowing free discharge that Missouri River flood water can enter lower Creve Coeur Creek and Fee Fee Creek during high river stages. Under this plan, flank levees along lower Creve Coeur Creek and Fee Fee Creek would be constructed such that protection from a 500-year flood frequency event would be provided (Figure 2-5). This 500-year flank levee system would extend from the Missouri River to the bluff line. Conveyance, not storage, would dictate the width of the lower Creve Coeur and Fee Fee creeks. The width of the proposed flank levee systems between the outside toes would vary from approximately 250 to 450 feet. A new gated structure would be constructed to control discharge from upper Creve Coeur Creek at its junction with lower Creve Coeur Creek (also Fee Fee Creek junction) to prevent flood water from backing up into the upper Creve Coeur Creek system. A pump station would also be required at this location to control interior drainage and to facilitate the discharge of interior Creve Coeur Creek water to the Missouri River. A smaller pump station with a capacity up to 500 cfs would be required to serve the Creve Coeur Creek watershed. As in Alternative A, a gated structure (flap gate) would also be utilized on Louiselle Creek near its confluence with Fee Fee Creek. There is an existing gated structure currently in place at the confluence of Louiselle and Fee Fee creeks.

Many final design details of the flank levee system have not yet been developed. However, according to discussions with the HBLD, the interior of the flank levee system will be constructed by excavation of areas adjacent to the existing creeks as is illustrated in Figure 2-5. Setback distances from the creek will vary, allowing for some preservation of the riparian corridor. Additionally, the existing channel will remain largely intact and convey normal creek flow. A new channel would be constructed within the interior of the flank system to convey normal creek flow. Under this alternative, most of the land within the flank levee system would be maintained in a condition that would sustain flood conveyance. Consequently, while herbaceous vegetation would be acceptable, woody vegetation would have to be managed to prevent blockage or significant impediment to stream flow.

2.2.1.4 Other Stormwater Improvement Options

Both flank levee alternatives may include a number of secondary improvements associated with stormwater conveyance to the primary systems of Creve Coeur and Fee Fee creeks. Specific hydraulic characteristics and geographic requirements of these improvements are presently undetermined due to the uncertainty of future land use improvements. These options are to implement minor, localized stormwater control associated with future development. Therefore, the requirements will be dictated by the type and character of future land use and site planning considerations, as well as overall stormwater management policies to be set forth in conjunction with the City of Maryland Heights, City of Chesterfield, HBLD, and MSD. These secondary options may include:

- Widening of Creve Coeur Creek from the outlet structure of Creve Coeur Lake to the junction of Fee Fee Creek to a total width of 50 feet between the inside toes of the flank levee banks. (The existing channel is approximately 33 feet in width.)
- Develop berms along Creve Coeur Mill Road on the west side of Creve Coeur Lake and along Marine Avenue east of Creve Coeur Lake to reduce flooding along Marine Avenue and adjacent ground and to increase storage volume of the lake.

- Develop a ditch system between Little Lake and Creve Coeur Creek. This is not likely to require a berm or a levee and may be accomplished with a large, flat bottom ditch.
- Raise the existing Louiselle Creek flank levees by up to 1 to 3 feet in specific locations. This improvement is contingent upon whether the existing culvert will remain in place or be redesigned and upgraded at Creve Coeur Mill Road.

2.2.2 MHE Extension South to Olive

Long-term transportation planning within the City of Maryland Heights has identified a need to improve the roadway connection between the newly constructed Page Avenue Extension and Olive Boulevard. At present, the City is undertaking the design and construction of the MHE, a four-lane roadway extending approximately 2.9 miles south from the Earth City Expressway at I-70 to River Valley Drive. This roadway facility is being constructed to a four-lane section but has sufficient right of way for its potential future expansion to six lanes. Currently, two through lanes with associated turn lanes are planned to be constructed from River Valley Drive south to the entry and exit ramps on the south side of Page Avenue. The new roadway has two bridges, a crossing of Fee Fee Creek south of the existing Casino Center Drive and a bridge over Creve Coeur Creek approximately 1,400 feet west of the intersection of Marine Avenue and the new MHE.

Concurrently, MoDOT has conducted preliminary studies (including the preparation of an Environmental Assessment) for the relocation of Route 141 from Ladue Road, north to Olive Boulevard and connecting to Creve Coeur Mill Road approximately 1,500 feet north of Olive Boulevard. The planned improvement for the relocated Route 141 is for a four-lane divided roadway with a single point diamond interchange at Route 141 and Olive Boulevard. Any future roadway improvements from the north would most likely connect to the planned future interchange of Route 141 and Olive Boulevard. In the absence of a four-lane connection between Olive Boulevard and Page Avenue within the Howard Bend floodplain, traffic from south and west St. Louis County that is destined for the Riverport/Harrah's area or I-70 is forced to use Creve Coeur Mill Road or existing I-270. This results in increased congestion on these existing roadways and deterioration in the level of service due to insufficient capacity during peak traffic periods.

In order to address this need, the City indicated that it proposes to design and construct a four-lane connector roadway (expandable to six lanes) from Olive Boulevard, extending parallel or along a portion of Creve Coeur Mill Road, to Page Avenue Extension (Figure 2-6). This action will also entail an expansion of the through capacity to four lanes up to River Valley Drive (currently being constructed with two through lanes and two turning lanes from River Valley Drive to Page Avenue). The intended timeframe for this proposed improvement is approximately between 2017 and 2022 given current funding forecasts. The typical cross section of such a roadway is illustrated in Figure 2-7. As is shown in Figure 2-6, the location is generally fixed in the vicinity of Page Avenue as it would connect at the existing interchange and would extend south along a 660-foot reserved transportation corridor through the Page Avenue mitigation lands. However, further south the precise location is presently undetermined as there are several conceptual options (Options 1 through 5) that extend up Creve Coeur Creek valley to Olive Boulevard. These five conceptual alignments share a number of common layout and design characteristics:

- Each alignment connects to the proposed single point interchange of Olive Boulevard and Route 141;
- Each alignment contains a bridge over the existing Union Pacific Railroad tracks and Creve Coeur Creek; and

- Each alignment contains a second crossing of Creve Coeur Creek approximately 1,200 feet north of Olive Boulevard.

However, each alignment is different in geometry, length, length of bridge, and length of roadway. Figure 2-6 provides a corridor area in which any of the five options may be developed. It is important to note that the conceptual corridor band varies in width from 155 feet to 900 feet. However, the actual roadway right of way required would only be a maximum of 200 feet.

Table 2-5 provides an overview of each conceptual alignment in terms of length of roadway, length of bridge structure, and estimated construction costs in 2003 dollars.

Table 2-5. Future MHE Extension – Page Avenue to Olive Boulevard

	Option 1	Option 2	Option 3	Option 4	Option 5
Project Length (feet)	8,687	8,793	8,898	9,212	8,746
Number of Lanes	6	6	6	6	6
Total Length of Bridge (feet)	3,740	3,860	2,540	2,252	3,514
Total Area of Bridge (square feet)	457,178	457,154	301,431	265,640	414,652
Bridge cost	\$29,716,570	\$29,715,010	\$19,593,015	\$17,266,600	\$26,952,380
Total Length of Roadway (feet)	4,947	4,933	6,358	6,960	5,232
Total Roadway Cost	\$10,046,617	\$9,467,861	\$11,097,461	\$11,721,838	\$10,987,200
Right of Way Cost	\$882,000	\$884,000	\$1,260,000	\$3,096,000	\$832,000
Grand Total (2003)	\$40,645,187	\$40,066,871	\$31,950,476	\$32,084,438	\$38,771,580
Grand Total (2010) at 4% Increase	\$53,486,294	\$52,725,269	\$42,044,647	\$42,220,932	\$51,020,754
Grand Total (2018) at 4% Increase	\$73,199,686	\$72,158,172	\$57,541,003	\$57,782,261	\$69,825,425

Single point interchange at Olive to be built by MoDOT.

Bridge structure lengths vary by alignment depending upon the extent of Creve Coeur Creek floodway to be traversed. One option would utilize a reserved corridor for a planned residential community approximately 1,200 feet north of Olive Boulevard. The City of Chesterfield requested that the proposed Terra Vista Estates development reserve a corridor in this area in anticipation of the future roadway improvement. This corridor was contingent upon zoning approval and has been recorded as a condition of the site development plan record of approval.

Detailed descriptions of the alignments are not provided at this time because of the anticipated long-term time horizon for this improvement. Changes in land use, ultimate final design of the Route 141/Olive Boulevard interchange, and natural resource systems associated with the Creve Coeur Creek system may well warrant a modification in design criteria and ultimately, the final constructed alignment. To select a final preferred alignment at this time would be premature and could potentially encumber property that may or may not be impacted until 2017 or beyond.

2.2.3 Other Roadway Improvements

2.2.3.1 Baxter Road Extension (Chesterfield Valley Spur) Connection

Long range transportation planning (i.e., year 2020) by the City of Chesterfield has identified the need to construct a new road to help address the future traffic need projected in the newly Proposed Conceptual Land Use Plan. This proposed improvement is currently under consideration by the City of Maryland Heights for adoption into its future transportation plan. The facility is proposed to be constructed in about 5 years and would connect the Chesterfield Valley to the Howard Bend study area via a two-lane roadway extending from the I-64/Baxter Road

intersection, to the proposed MHE between Page Avenue and Olive Boulevard (Figure 2-8). After bridging Bonhomme Creek, the proposed roadway would become aligned parallel to the Union Pacific Railroad and extend approximately 4.6 miles in total length along what is known as Waterworks Road.

Preliminary traffic studies and long range forecasts demonstrate that such a facility could carry between 12,000 and 15,000 vehicles per day (AADT—average annual daily traffic) if connected to the MHE. The road is planned as a minor arterial road which will augment the urban principal arterial system (I-64, Route 141—Woods Mill, Route 340—Clarkson-Olive Boulevard).

No engineering studies have been conducted for the Baxter Road Extension to determine alignments or right of way, but it is thought that it will be initially constructed as a two-lane facility (upgradeable to four lanes). The roadway would also likely be designed to incorporate pedestrian and bicycle facilities to connect Chesterfield Valley to the Katy Trail.

2.2.3.2 Hog Hollow Road Relocation

The relocation of Hog Hollow Road in the vicinity of the Missouri American Water Company (formerly St. Louis County Water Company) is a reasonable foreseeable future action in light of the current emphasis on Homeland Security. This action is viewed as needed to increase security logistics and control at the facility. A relocated Hog Hollow Road would also provide more direct access for motorists in the southwestern portion of the study area to Olive Boulevard. At present, Hog Hollow Road extends north to northeast from Olive Boulevard to River Valley Drive; as a result, it divides the property of the American Water Company facilities. The water plant treats Missouri River water and distributes the potable water to its customers in west St. Louis County. The plan would be to relocate an approximately 0.9-mile section of Hog Hollow Road which bisects the water plant operation and relocate it to the east of the water plant while maintaining the connection to River Valley Drive (see Figure 2-8).

2.2.4 Expansion of MSD Plant

MSD owns and operates the Missouri River wastewater treatment plant in the central portion of the study area north of Creve Coeur Mill Road at Marine Avenue (Figure 2-9). This plant serves approximately 150 square miles of Maryland Heights, Chesterfield, and parts of Creve Coeur, Hazelwood, Bridgeton, St. Ann, Ellisville, Ballwin, and unincorporated St Louis County.

This facility is designed to treat approximately 28 million gallons per day (mgd) of wastewater and is currently at capacity. During periods of peak demand, often correlating with significant rainfall events, the plant has treated up to 80 mgd. Currently, the capacity of the existing facility is a factor limiting further development.

MSD has conducted a preliminary study to increase plant capacity to 39 mgd. The funds necessary for this improvement, however, have not been secured. It is anticipated, however, that expansion of the plant will occur in the reasonably foreseeable future as this additional capacity will be a prerequisite to further development within the study area. Probable areas for plant expansion include a 44-acre area located immediately south of the existing plant (see Figure 2-9)

2.2.5 Build Out of City of Maryland Heights Final Draft Howard Bend Future Land Use Plan

In conjunction with its ongoing efforts to update its Community Comprehensive Plan, the City of Maryland Heights has adopted a Final Draft of the Future Land Use Plan for the Howard Bend

Planning Area (City of Maryland Heights, 2002, available on the City's web site). In the context of the assessment of cumulative impacts, this land use plan may be used to predict the potential nature and extent of future development within the Howard Bend area. The City of Maryland Heights' planning initiative responds to existing conditions as well as present and predicted market factors, and is intended to establish guidelines and strategies to direct overall infrastructure development and land use in the Howard Bend study area. In conjunction with this effort, the City has subdivided the Howard Bend Planning Area into five districts (Figure 2-10). Unconstrained lands within the study area that may be subject to future build out in accordance with the City of Maryland Heights' Future Land Use Plan are identified in Figure 2-11. Permissible land uses within each of these districts have also been established as indicated in Table 2-6.

Table 2-6. Permissible Land Uses within Each Howard Bend Planning District

Land Use	Planning District				
	Riverport/ Harrah's	CCLMP	Expressway Corridor	River Valley Corridor	Missouri River Front
Manufacturing	Prohibited	Prohibited	Prohibited	Prohibited	Prohibited
Light Industrial	Discouraged	Prohibited	Conditional	Conditional	Prohibited
Office Distribution	Conditional	Prohibited	Conditional	Encouraged	Prohibited
Warehousing	Discouraged	Prohibited	Discouraged	Conditional	Prohibited
Office	Encouraged	Prohibited	Encouraged	Encouraged	Prohibited
Retail	Discouraged	Prohibited	Discouraged	Discouraged	Prohibited
Restaurant	Encouraged	Conditional	Conditional	Discouraged	Prohibited
Motor Vehicle Oriented Businesses (MVOB)	Conditional	Prohibited	Conditional	Discouraged	Prohibited
Hotel	Encouraged	Prohibited	Encouraged	Discouraged	Prohibited
Residential	Prohibited	Prohibited	Prohibited	Prohibited	Prohibited
Recreational	Conditional	Encouraged	Conditional	Conditional	Conditional
Agricultural	Prohibited	Discouraged	Conditional	Conditional	Conditional

Source: City of Maryland Heights, 2002.

For the purposes of this EIS, two development scenarios were developed for analysis of cumulative impacts. Each of these two scenarios assume that approximately 2,100 acres of unconstrained lands may be affected by future development. However, each scenario differs in the potential density of development that would likely occur on lands impacted by flooding of Creve Coeur and Fee Fee creeks.

- Scenario 1 – Interim Condition.** This scenario assumes an eventual 100 percent buildout of all the unconstrained lands identified in Figure 2-11 in the absence of a flank levee system. Under this scenario, each site development project would be required to detain and accommodate local stormwater as there would not be a centralized stormwater conveyance system in place. The 100-year floodplain as represented by the CLOMR (see Figure 3-8) would be a constraint to future development that would slow, but not totally deter development. Developers proposing to construct facilities within such areas would be required to dedicate a greater portion of their total site to stormwater conveyance (ditches, etc.) and storage (wet/dry detention basins, etc.).

- **Scenario 2 – Ultimate Condition.** Under Scenario 2, development within unconstrained lands would be supported by further reductions in designated 100-year floodplain (see Section 2.2.1) and the presence of a centralized stormwater conveyance system. As predominantly defined by a well developed flank levee system for Creve Coeur and Fee Fee creeks, potential future development projects would not be as constrained by the need to accommodate as much stormwater. Consequently, the unconstrained lands identified on Figure 2-11 will be expected to develop more rapidly and at a somewhat higher density.

The following provides an overview of the goals and development guidelines for each of the five planning districts as it is presented in the City of Maryland Heights' Future Land Use Plan (City of Maryland Heights, 2002).

Riverport/Harrah's

The principal elements of this planning district are the Riverport Business Park and Harrah's Hotel and Casino. While still under development, the character and pattern of uses in the district are already established by these planned developments. The remainder of the district is M-2 Heavy Industrial District, and is characterized by the Fred Weber quarry and landfill. The district makes up about 11 percent of the Howard Bend Planning Area.

Vision – The vision for the Riverport/Harrah's District is to complete build-out according to the Planned Development plans approved by the City of Maryland Heights. High development intensity is desirable within this district. However, providing opportunities for pedestrian linkage, the creation of public spaces, and amenities within each project site are essential components to the character and quality of the district.

Development Policies – It is the policy and intent of the City of Maryland Heights to continue the build-out of the approved Planned Development District with the specifically defined uses and performance standards already in effect. Interior stormwater management within the district is the responsibility of each developer.

Creve Coeur Lake

The Creve Coeur Lake District is unique in the Howard Bend Planning Area in that it is owned and managed almost in its entirety by the St. Louis County Parks Department. This planning district encompasses nearly 20 percent of the Howard Bend Planning Area and supports both active and passive recreation uses. Creve Coeur Lake Memorial Park (CCLMP) dominates the district north of Page Avenue, whereas the Page Avenue mitigation lands represent the remainder of the district south of Page Avenue. Comprehensive planning for these lands is currently being undertaken by the County as part of a master planning process.

Vision – The City envisions that the Creve Coeur Lake District will continue as a major regional destination for a variety of active and passive recreation uses, some of which are unique to the region, and all of which are supportive of the City of Maryland Heights' hospitality industry. A planned development park district is intended to be created as a mechanism to establish a partnership with the County to facilitate the future use and management of County park lands.

Development Policies – Future development within this district will consist of both active and unique sports structures and facilities such as a velodrome, horse arena, exercise track, skateboard park, and other recreation facilities. Selected hospitality services such as restaurants that are integral to these facilities will also be permitted. Parking facilities to support these uses will be encouraged to incorporate designs that have a low environmental and storm water impact (e.g., pervious parking surfaces).

Expressway Corridor

The Expressway Corridor has the highest long-term potential for commercial development. It is the largest planning district in the Howard Bend Planning Area, containing 27 percent of the land area. Moreover, the district incorporates as its spine the region's future outer-belt arterial highway – the Earth City/MHE. The Expressway will provide regional access to the Planning Area, and to this district in particular. The district will include four at-grade intersections along the Expressway – at Prichard Farm, Marine, River Valley, and Sportport roads.

Vision – This district is envisioned as a premier business center in the St. Louis region, containing a lively area with office, hospitality, and other compatible land uses.

Development Policies – The Expressway Corridor and the edges near CCLMP should include first class office space and accessory commercial uses. Offices should occupy approximately 75 percent of the land in the district, with the remainder consisting of business service center uses including motor vehicle oriented businesses and hospitality related uses. This corridor could develop along lines similar to the area along the I-64 corridor in west St. Louis County. In the airport and northwest area, business service centers and service and distribution centers are envisioned to be the dominant component, occupying approximately 75 percent of the land area, with office uses occupying approximately 25 percent of the area. An urban design plan to be developed in the future will address building massing, orientation and materials; relationship of buildings to the public right of way; mix of uses; street level activity; integration of trails and open space; creation and protection of viewsheds; vehicular parking, access and circulation; and others. Retail uses will be permitted only when they are integrated into the first floor of the business park use, and the use of first floor space for this purpose will be encouraged. The development of freestanding retail centers is discouraged. Additionally, “Big Box” retail is not consistent with this Plan, as it would be out of scale with the pedestrian orientation desired for the area. Interior stormwater management will be the responsibility of the developer and should incorporate non-structural techniques to the maximum extent feasible. Office development within this district is intended to include public spaces integrated with the overall development. Additionally, the integration of architecture and design with open space, water features, public amenities, and stormwater management will be required. The MHE is intended to be developed as a “parkway,” with linear green areas, landscaping, and other streetscape elements such as lighting, being incorporated as an integral part of the design of the Expressway. Where the Expressway intersects with the stormwater conveyance system, efforts will be made to incorporate water features within view of the Expressway. A trail may also be developed adjacent to the main levee and on the under seepage berm that could be as much as 4.3 miles in length.

River Valley

The River Valley District is located at the southern end of the Howard Bend Planning Area, furthest from the highway system. At present, the area consists exclusively of agricultural land uses. The district makes up just over 20 percent of the Howard Bend Planning Area.

Vision – This district will consist of high quality, but lower intensity office distribution and business service centers with integrated architectural and site design.

Development Policies – The City of Maryland Heights recognizes that this district will likely be the last area to develop with high quality business uses due to the need to phase improvements that improve accessibility to the area. The City will explore and facilitate access to the regional transportation system from this district, although the MHE Extension is not anticipated to be completed until some time between 2017 and 2022. Recreation related land uses, such as a

golf course are appropriate for this southernmost area. Sound access management principles will be followed, pursuant to an overall Traffic Management Plan for the area.

Missouri Riverfront

The Missouri Riverfront is the only planning district that will be outside the 500-year levee. The land area between the levee and the Missouri River is either in a natural state or is used for agriculture. It comprises 23 percent of the Howard Bend Planning Area. Covering nearly 2,000 acres, the district is located entirely within either the regulated floodway or the floodplain. As a result, the lands that are actively farmed are often flooded. It is rich in wildlife habitat, and is often used for local hunting activities. It is also the location of borrow pits for the construction of the 500-year levee.

Vision – The character of this area is not envisioned to change substantially. It will remain as open space, and will be incorporated into the evolving regional network of open spaces. To the extent that changes are encouraged, they will be in the direction of expanding the natural character of the area, not in the direction of expanded active agricultural uses. Important viewsheds will be preserved. Low impact access to the area will be provided to the public in such a way that the environmental integrity of the area is maintained and private property rights are respected.

Development Policies – Existing agricultural uses within this district are recognized as a legitimate form of land use. However, the further loss of natural habitats will be discouraged. Additionally, sound wildlife management techniques and principles will also be encouraged within this district along with environmental mitigation and low impact walkways to facilitate passive recreation. The viewshed of the Missouri River from Page Avenue will also be maintained in a natural condition within this district.

2.2.6 Terra Vista Estates Development

The Terra Vista Estates development is a planned subdivision by the Levinson Corporation consisting of 32 homes located in the floodplain of Creve Coeur Creek north of Olive Boulevard. The project as proposed is platted as a subdivision by the City of Chesterfield and entails the construction of an access road connecting to Creve Coeur Mill Road and placement of fill areas within the floodplain and floodway of Creve Coeur Creek (see Figure 2-9). This proposed development has been approved by the City of Chesterfield and is currently going through the re-zoning process.

2.2.7 Mill Ridge Villas Development

The Mill Ridge Villas development is a subdivision proposed by the Jones Company consisting of 46 townhomes located in the floodplain of Creve Coeur Creek north of Olive Boulevard. The project as proposed would be located within the limits of the City of Chesterfield and would entail the construction of an access road (Amiot Drive) connecting to Creve Coeur Mill Road (see Figure 2-9). A preliminary plat of this proposed development is currently being reviewed by the City of Chesterfield.

2.2.8 Dredging of Creve Coeur Lake

As a result of the mitigation commitments made in conjunction with the Page Avenue Extension project, MoDOT is obligated to improve the overall depth of Creve Coeur Lake by dredging of the open water area. This action will entail the removal of approximately 2 million cubic yards of material which will be placed in each of two designed upland disposal facilities (see Figure 2-9). Total area of the two disposal facilities is approximately 95.7 acres. As proposed, the dredging will be performed using a hydraulic dredge which will convey a slurry of material to the facilities.

The perimeter of each facility will consist of a berm that will effectively contain the slurry. Water carried in the slurry will be decanted off and returned to the lake, allowing the dredged material to dry and settle out. In time (approximately 15 to 20 years), the spoil material will be sufficiently dried out as to be suitable for additional recreational development by MoDOT.



U.S. Army Corps of Engineers
St. Louis District

Howard Bend Floodplain EIS



Legend

- Protected Wetland
- Un-Protected Wetland

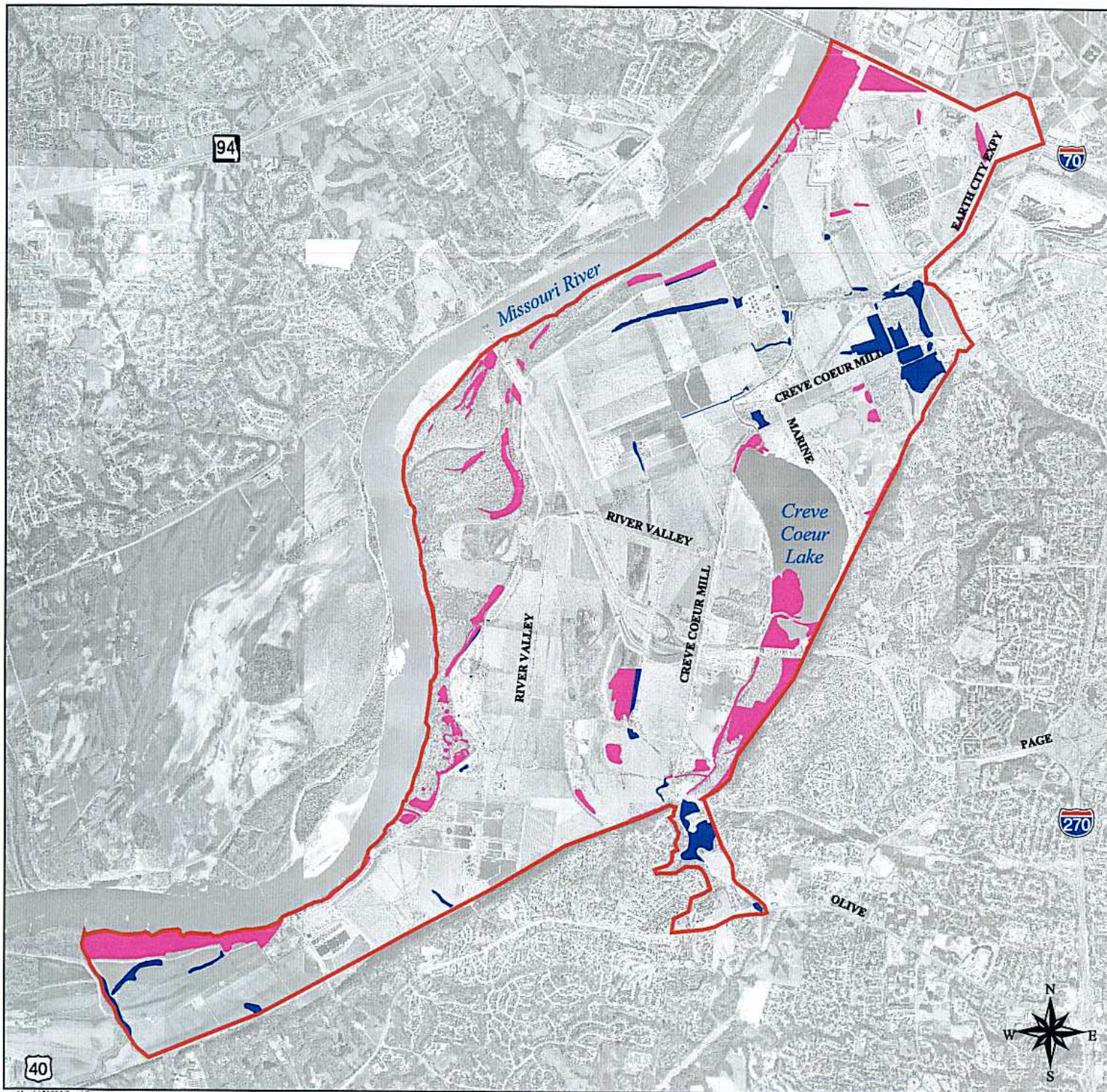
- Study Area
- Interstate Hwy
- US Hwy
- State Hwy

1:60000
0.5 0 0.5 1 Miles

March 10, 2004

Figure 2-1
Wetland Areas
Protected by the SAMP

 MACTEC, Inc.





U.S. Army Corps of Engineers
St. Louis District

Howard Bend Floodplain EIS



Legend

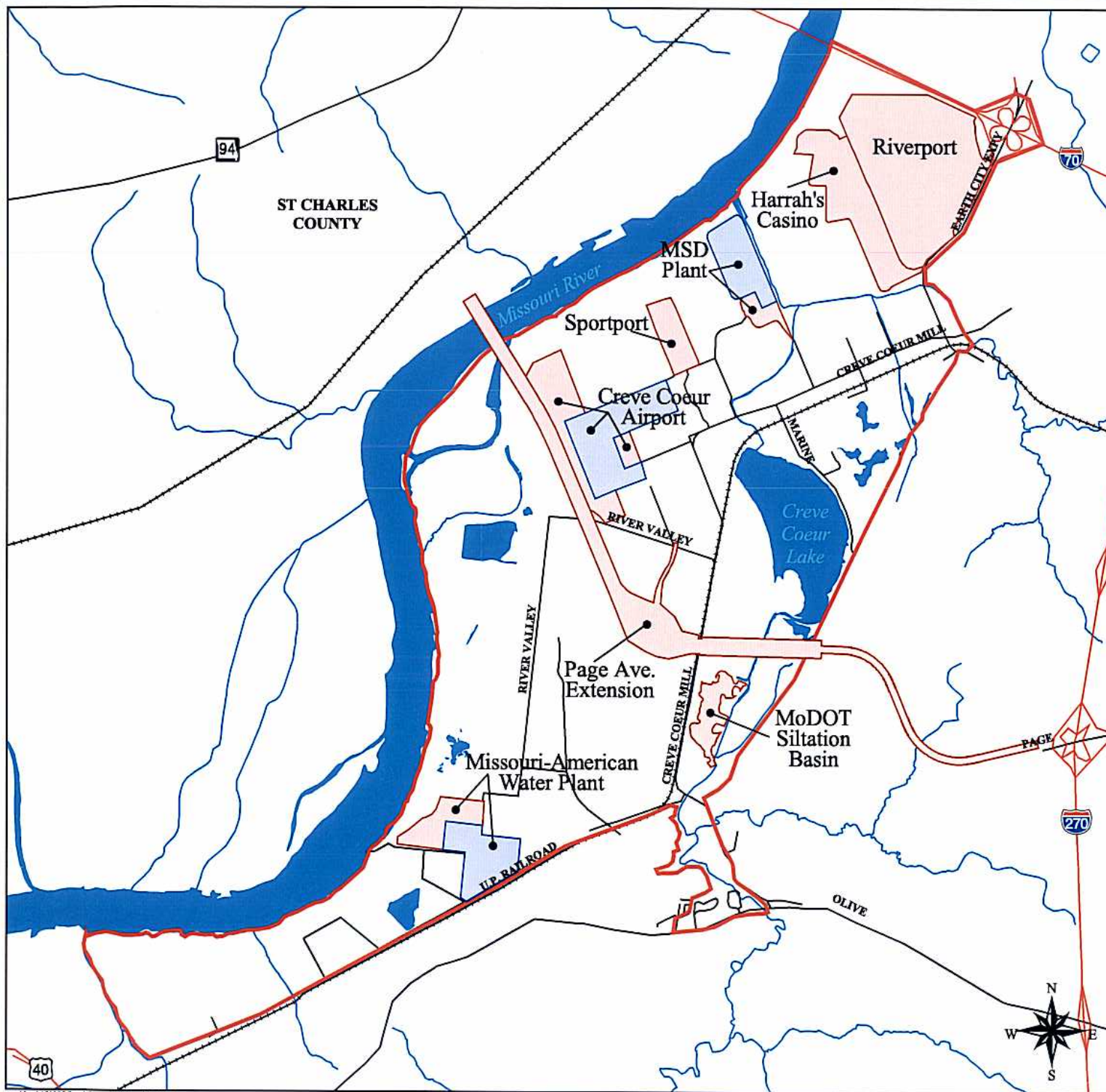
- Past Project
- Existing Facility

- Study Area
- Interstate Hwy
- US Hwy
- State Hwy
- Road
- Railroad
- Stream
- Water

1:60000
0.5 0 0.5 1 Miles

June 12, 2003

Figure 2-2
Past Projects within
the Howard Bend Area





U.S. Army Corps of Engineers
St. Louis District

Howard Bend Floodplain EIS



Legend

- Present Project
- Page Avenue Extension

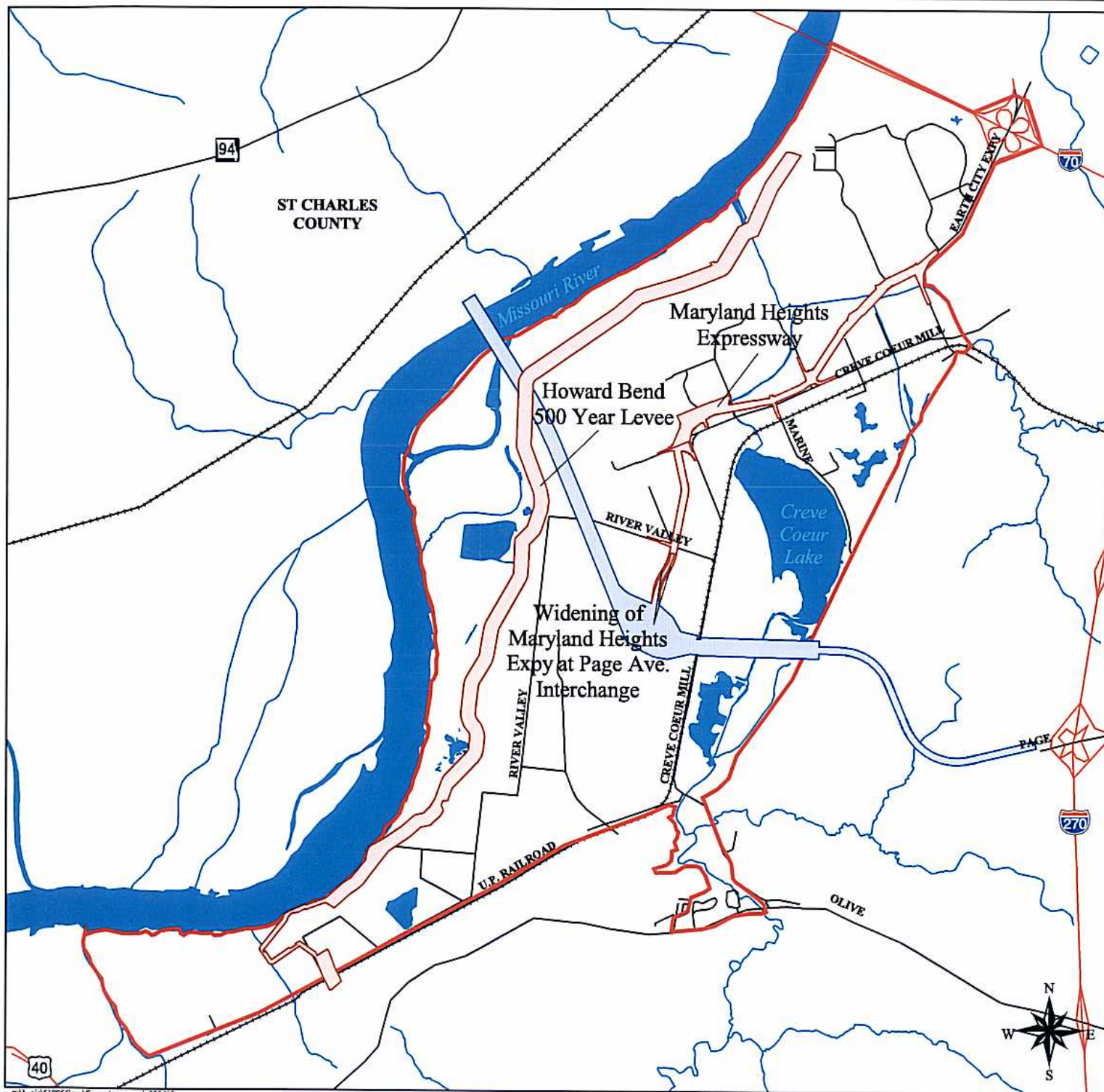
- Study Area
- Interstate Hwy
- US Hwy
- State Hwy
- Road
- Railroad
- Stream
- Water

1:60000
0.5 0 0.5 1 Miles

June 12, 2003

Figure 2-3
Present Projects within
the Howard Bend Area

MACTEC, Inc.





U.S. Army Corps of Engineers
St. Louis District

Howard Bend Floodplain EIS



Legend

- Cross Sections
- New 500 Year Levee
- Conveyance/Flood Storage Area
- Flank Levee
- Alternative A Gate Structure and Pumping Station

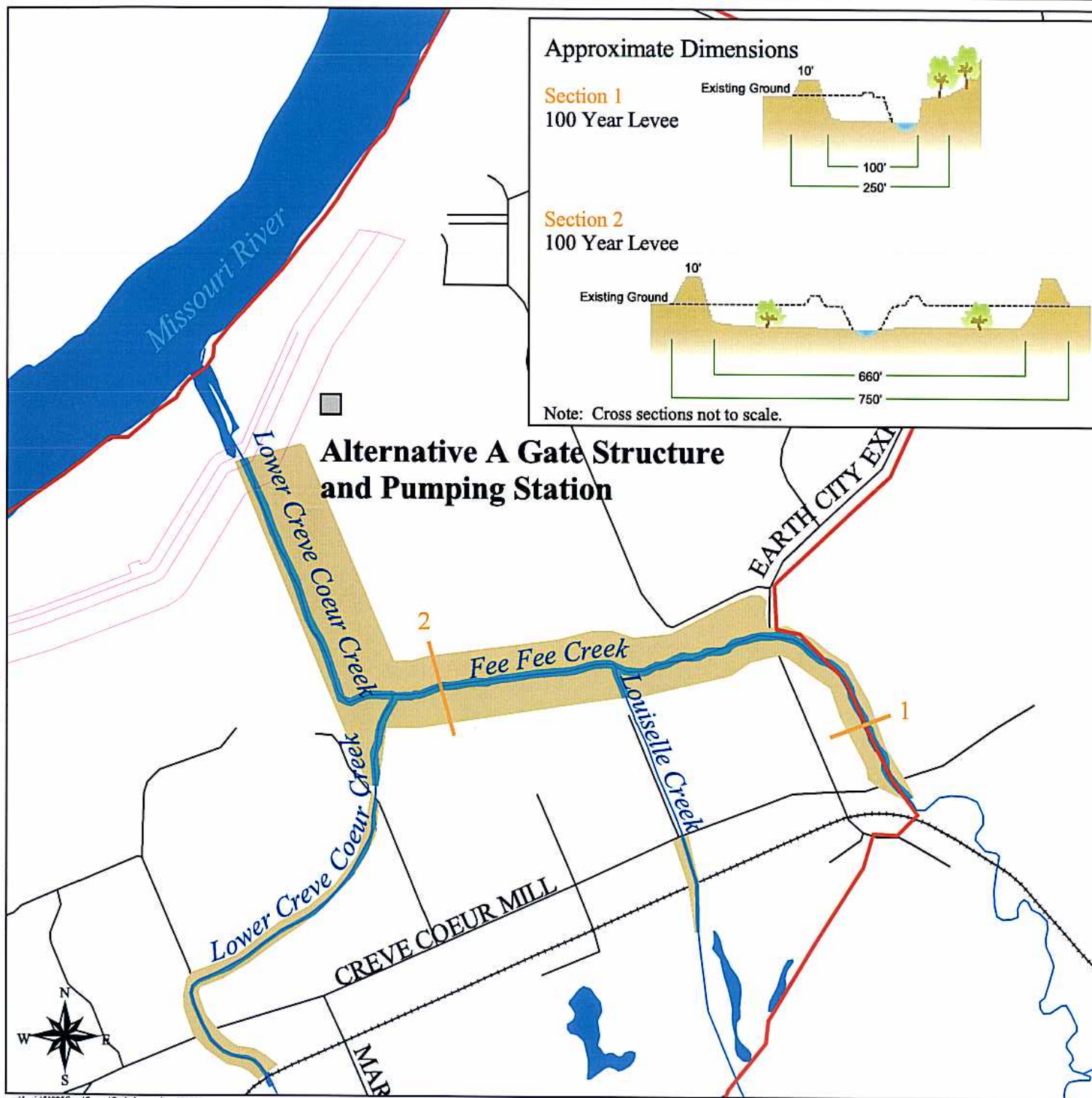
- Study Area
- Railroad
- Road
- Stream
- Water

1:20000
1000 0 1000 2000 Feet

October 23, 2003

Figure 2-4
Future Flank Levee Alternative A:
Gated Discharge at
Missouri River

 MACTEC, Inc.





U.S. Army Corps of Engineers
St. Louis District

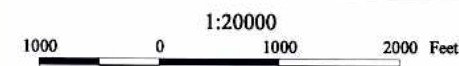
Howard Bend Floodplain EIS



Legend

- Cross Sections
- New 500 Year Levee
- Conveyance/Flood Storage Area
- Flank Levee
- Underseepage Berm
- Alternative B Gate Structure and Pumping Station

- Study Area
- Railroad
- Road
- Stream
- Water



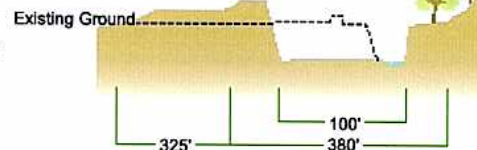
October 23, 2003

Figure 2-5
Future Flank Levee Alternative B:
Gated Discharge at Creve Coeur /
Fee Fee Creek Confluence

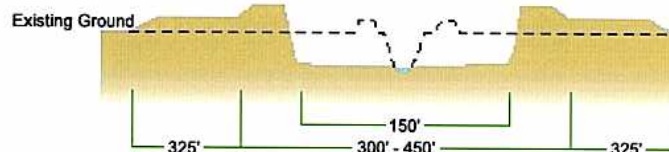
 **MACTEC, Inc.**

Approximate Dimensions

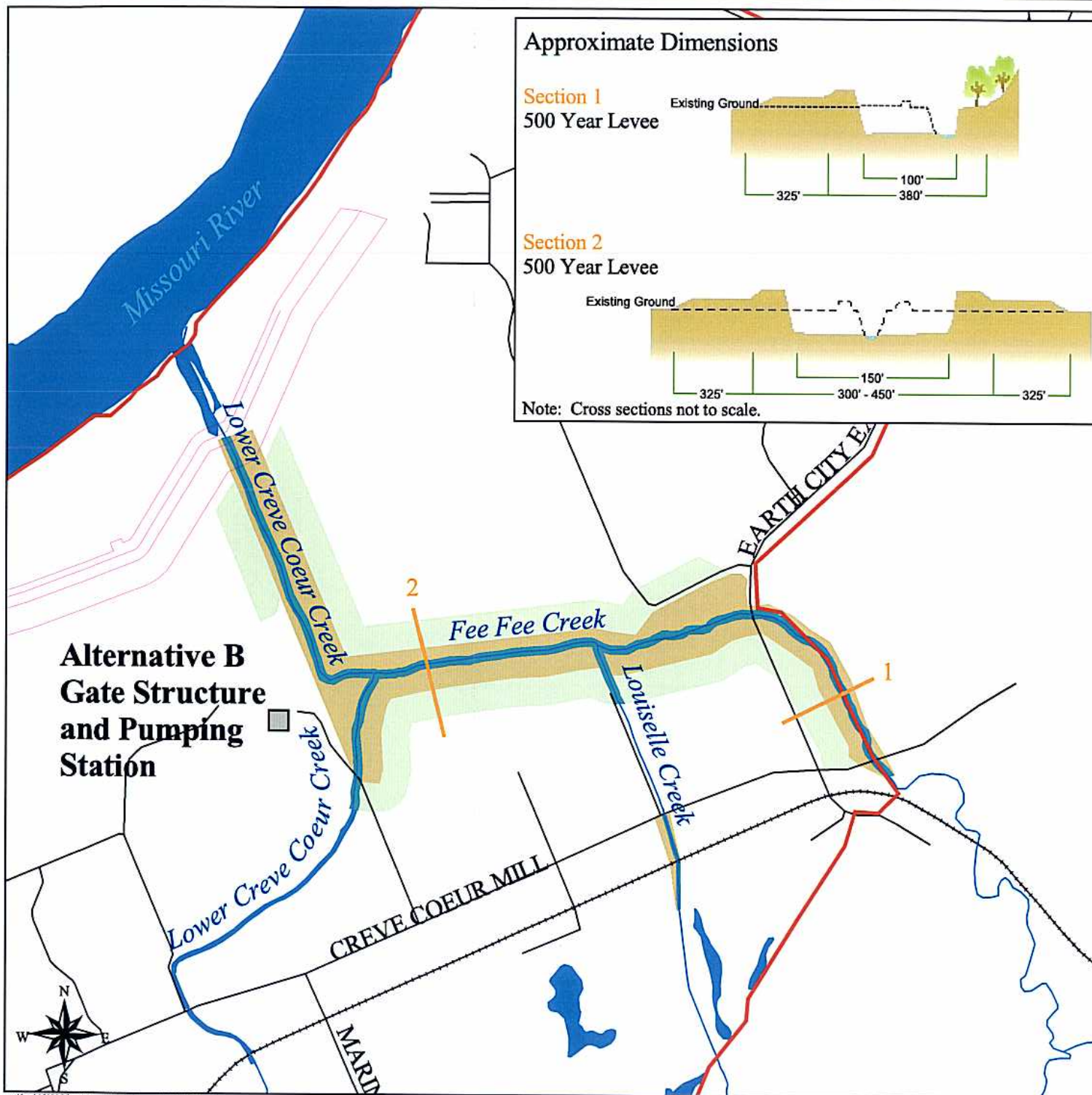
Section 1 500 Year Levee



Section 2 500 Year Levee



Note: Cross sections not to scale.










U.S. Army Corps of Engineers
St. Louis District

Howard Bend Floodplain EIS



Legend

-  Maryland Heights Expressway Extension Range of Alternates
-  To Be Constructed By MoDOT (Rt. 141 Relocation Not Included)

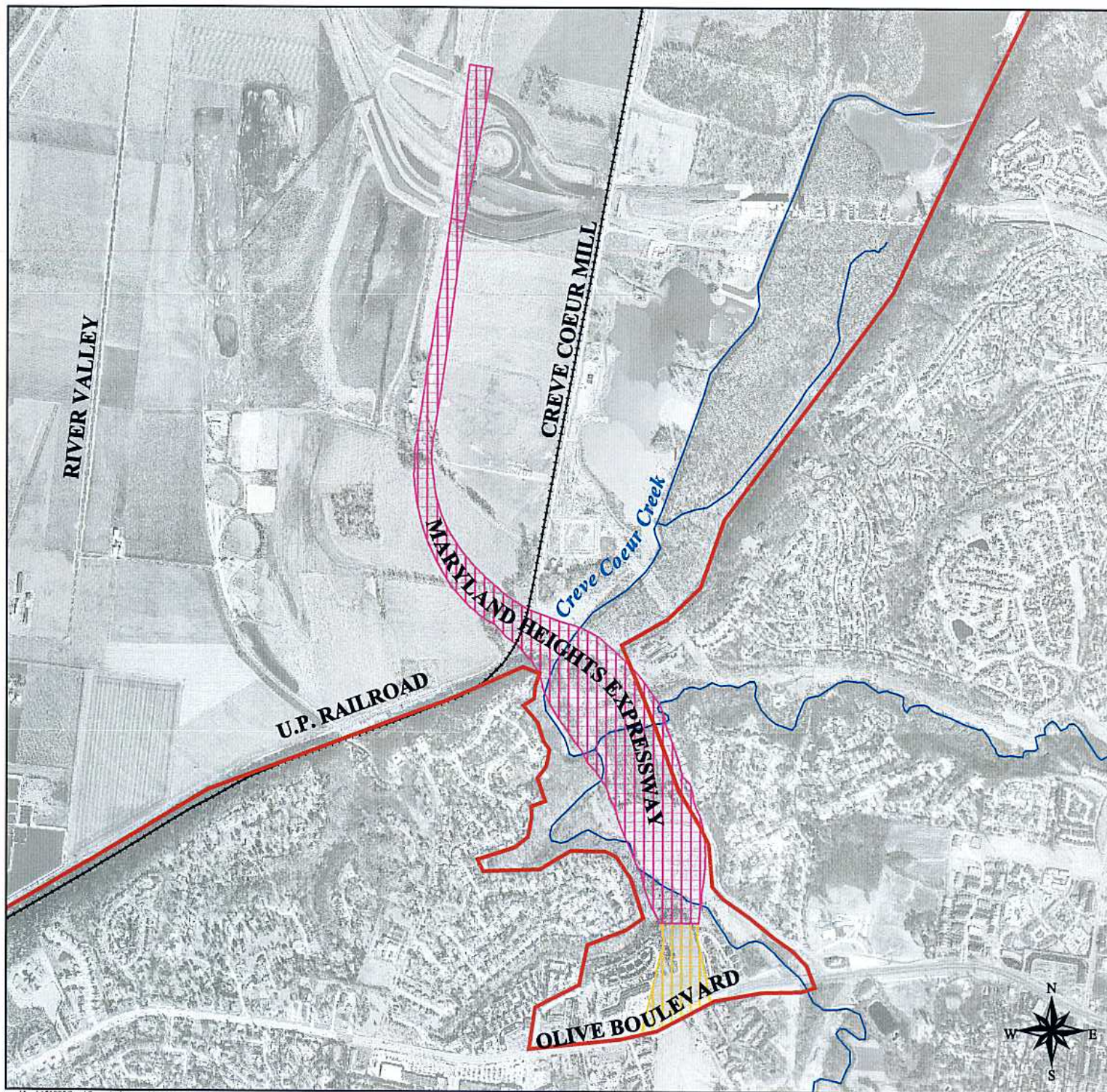
-  Study Area
-  Railroad
-  Stream

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October 23, 2003

Figure 2-6
Future MHE Extension
to Olive Boulevard

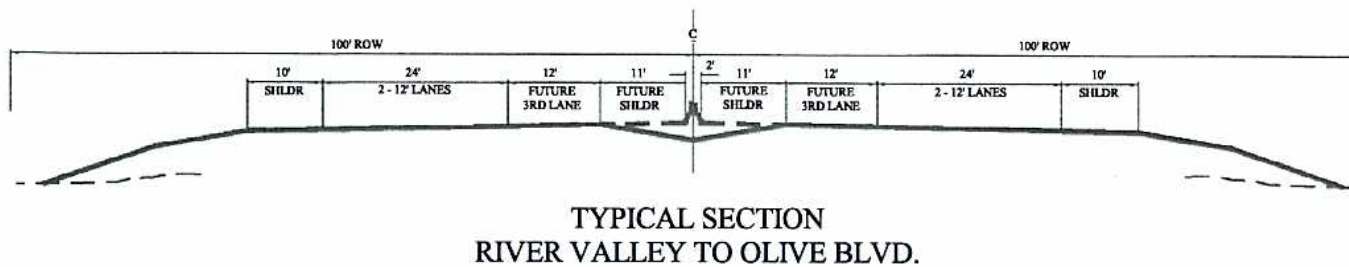
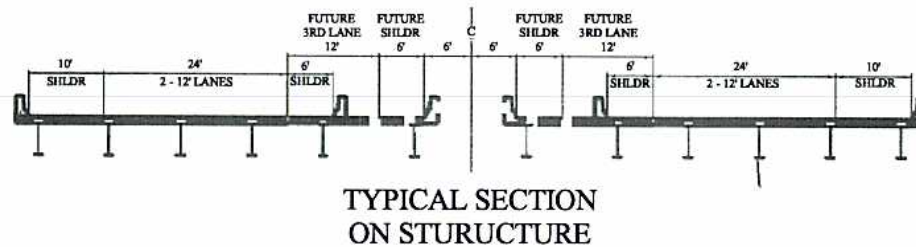
 MACTEC, Inc.





U.S. Army Corps of Engineers
St. Louis District

Howard Bend Floodplain EIS



June 4, 2003

Figure 2-7
Typical Bridge and Roadway
Sections for the MHE Extension



U.S. Army Corps of Engineers
St. Louis District

Howard Bend Floodplain EIS



Legend

- Baxter Road Extension/Chesterfield Valley Spur Connection and Hog Hollow Relocation
- Potential Range of Alternatives for Eastern Terminus

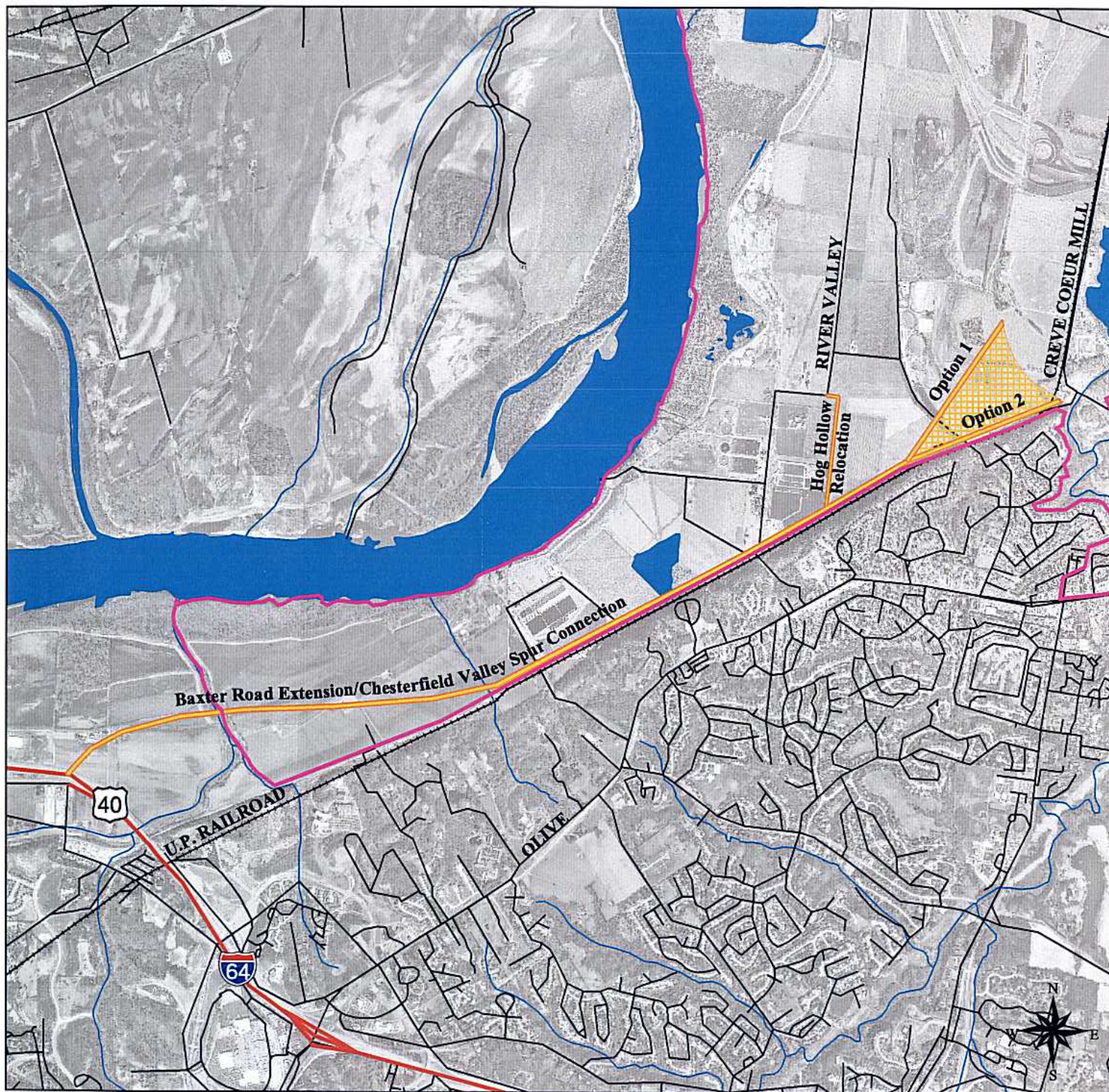
- Study Area
- Railroad
- Interstate Hwy
- Stream
- US Hwy
- Water
- Road

1:40000
0.5 0 0.5 Miles

March 12, 2004

Figure 2-8
Baxter Road Extension (Chesterfield Valley Spur) Connection
and Hog Hollow Relocation

 MACTEC, Inc.





U.S. Army Corps of Engineers
St. Louis District

Howard Bend Floodplain EIS



Legend

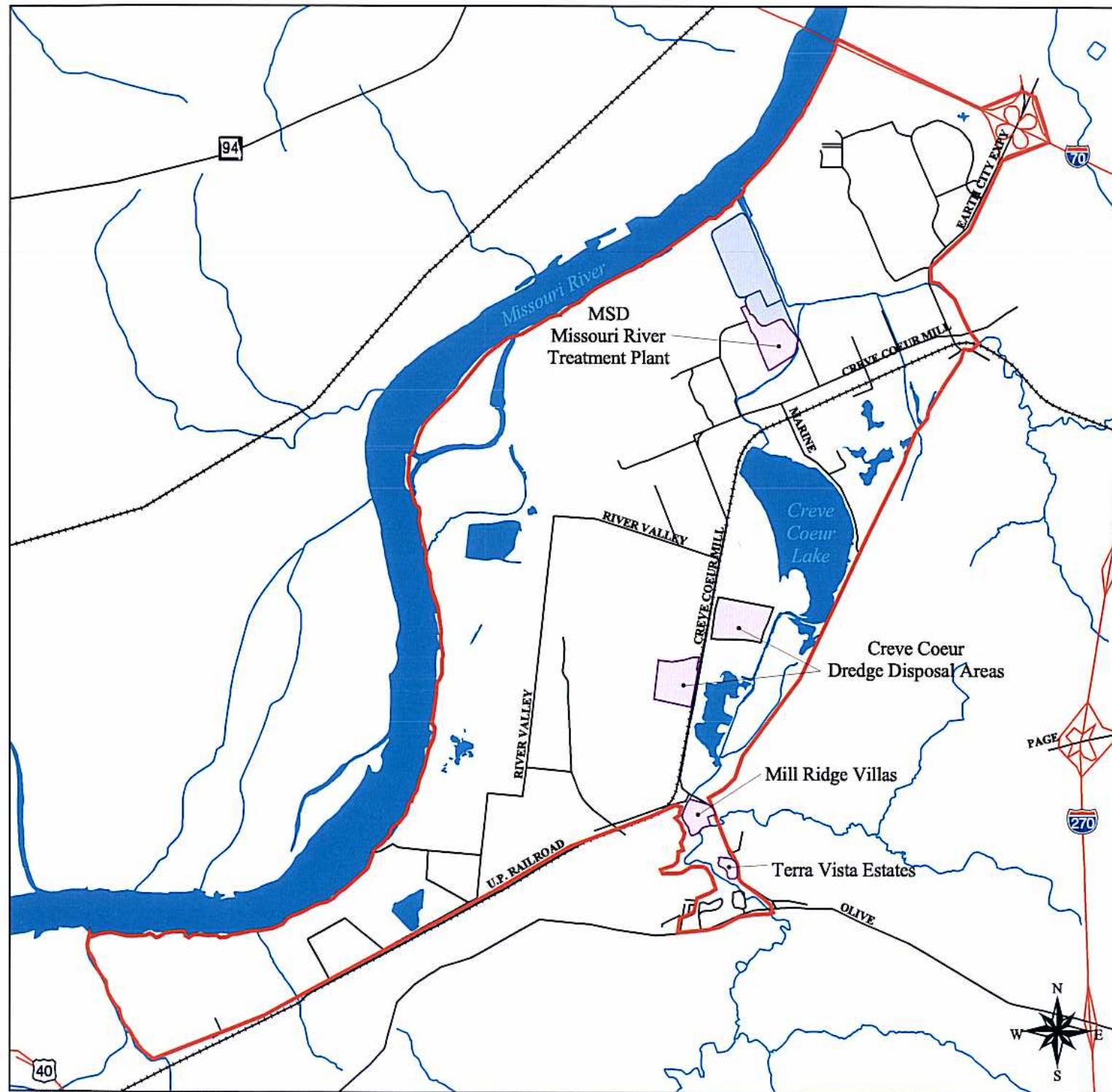
- Future Project
- Existing Facility

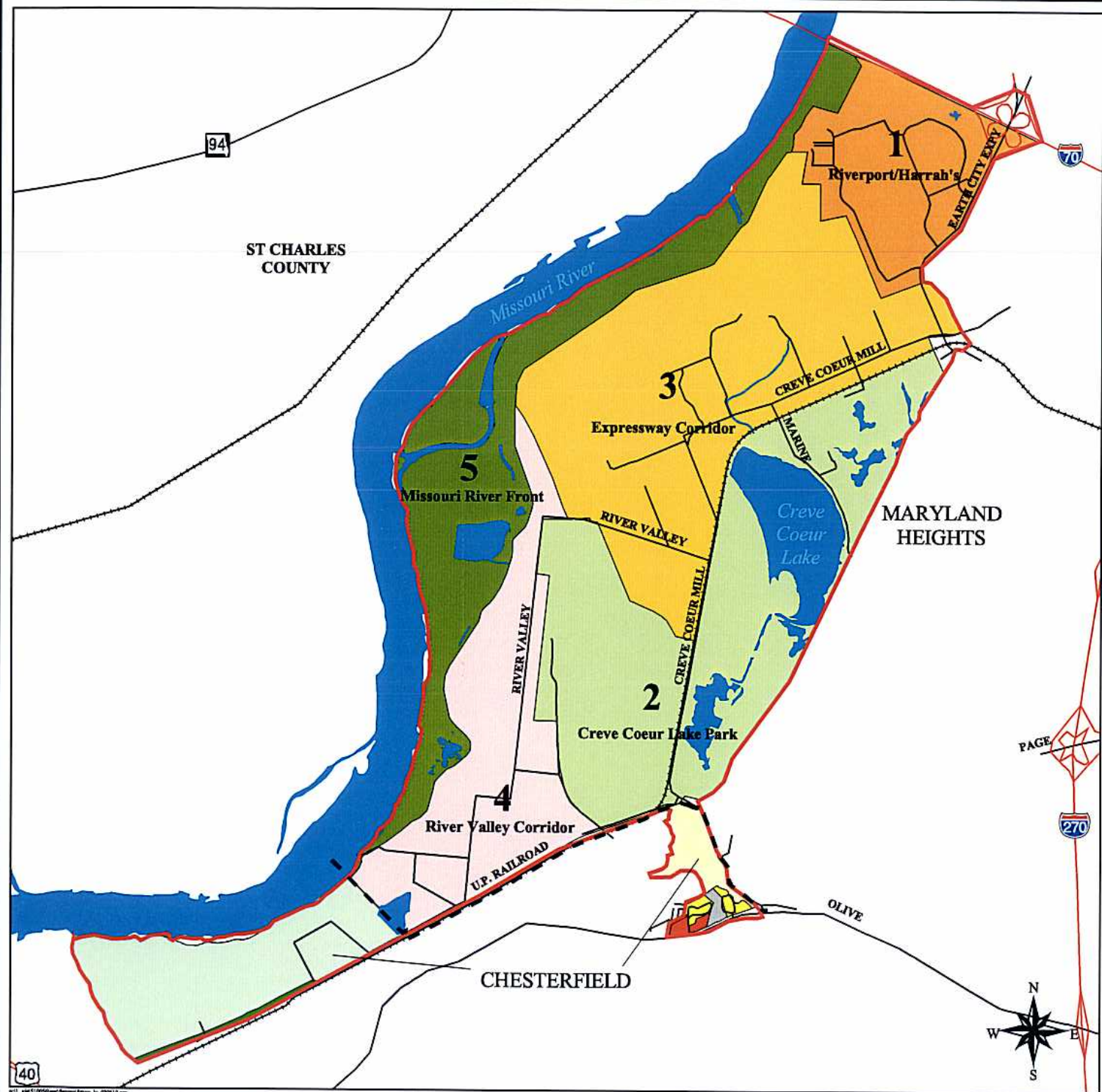
- Study Area
- Interstate Hwy
- US Hwy
- State Hwy
- Road
- Railroad
- Stream
- Water

1:60000
0.5 0 0.5 1 Miles

March 1, 2004

Figure 2-9
Future Minor Actions within
the Howard Bend Area





U.S. Army Corps of Engineers
St. Louis District

Howard Bend Floodplain EIS



Legend

Maryland Heights Planning Districts

- 1 Riverport/Harrah's
- 2 Creve Coeur Lake Park
- 3 Expressway Corridor
- 4 River Valley Corridor
- 5 Missouri River Front

Sources: Cities of
Maryland Heights
and Chesterfield

Chesterfield Conceptual Plan

- Agricultural
- 141 Corridor
- Multi-Family Residential
- Single Family Residential
- Office Park
- Retail
- Park/Recreation

- Study Area
- Interstate Hwy
- US Hwy
- Road
- Road
- Railroad
- Stream
- Water

1:60000
0.5 0 0.5 1 Miles

June 12, 2003

Figure 2-10
Future Land Use



U.S. Army Corps of Engineers
St. Louis District

Howard Bend Floodplain EIS



Legend

Zones of Permissible Development

- | | |
|----------------|----------|
| Study Area | Road |
| Interstate Hwy | Railroad |
| US Hwy | Stream |
| State Hwy | Water |

1:60000
0.5 0 0.5 1 Miles

June 12, 2003

Figure 2-11
Zones of
Permissible Development

MACTEC, Inc.

